LABORATORY FUME HOODS

THE NEW TECHNOLOGY

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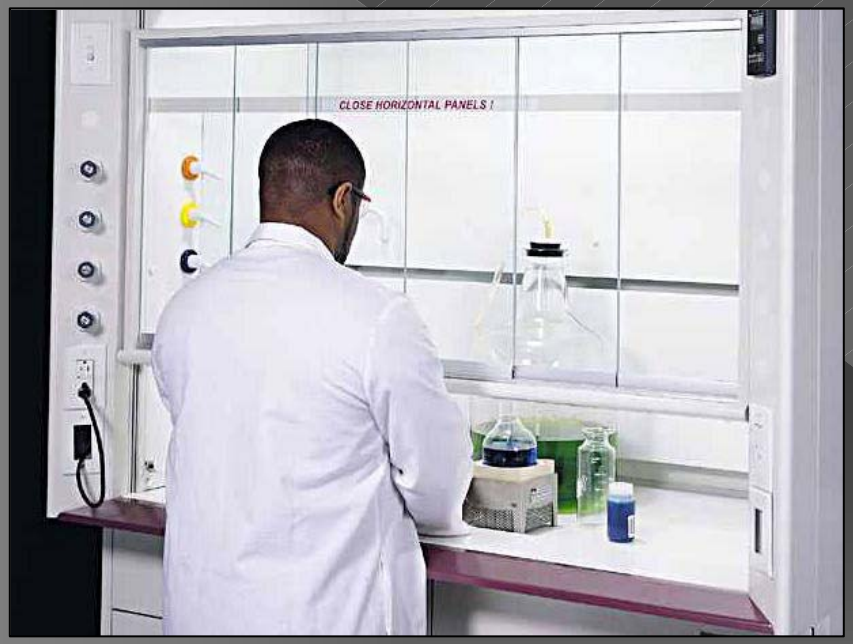
Who has a low-flow product offering?



LABCONCO

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The Rest of the Players

- Fisher Hamilton
- Lab Crafters
- And others just around the corner, like;
  - The Push-Pull Hood designed at LBNL

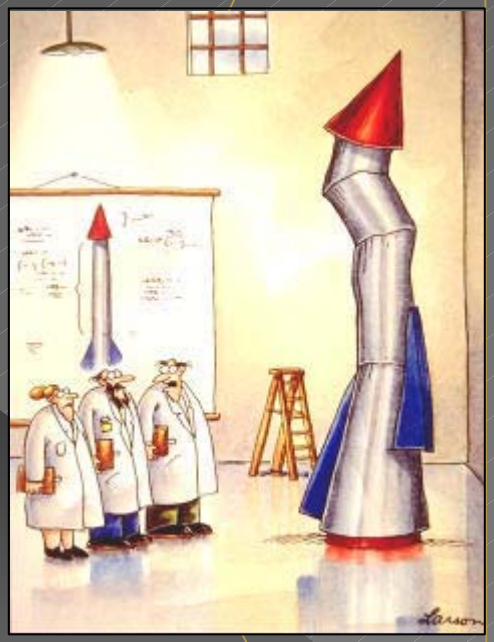
Pioneer

Air Sentry

LBNL Push-Pull

Advanced Technologies!

- Fortunately product developers like:
  - Robert DeLuga
  - Bob Haugen
  - Jon Zboralski
  - Kevin Gilkenson
- And engineers like:
  - Gerhard Knutson
  - Tom Smith
  - Dale Hitchings



"It's time we face reality, my friends…We're not exactly rocket scientists."

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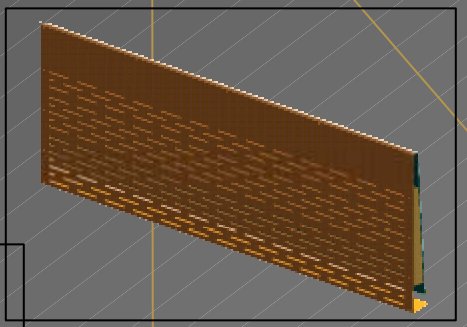
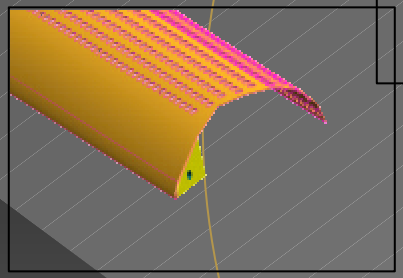
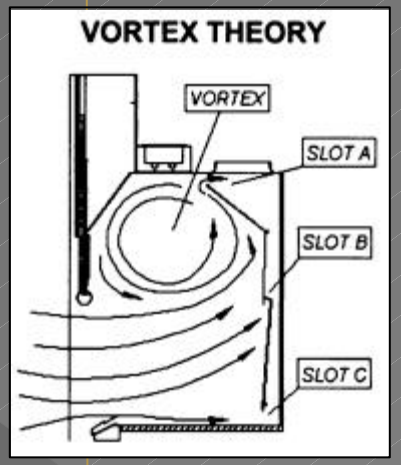
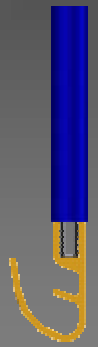
Engineering Developments
AmericanIngenuity@Work.com

- Baffle designs
- High performance air foil
- Aerodynamic sash handle
- Airflow assist fans, the push in push-pull
- Operator protection with induced air curtain









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In what ways are they superior to standard fume hoods?

It's all about …

CONTAINMENT!

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Containment & ASHRAE-110

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So what about face velocity?

- Does it still matter?
- What should it be?

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How do the new designs compare?

- They don't….not in the traditional sense.
- But they do from a performance standpoint.
- How do you specify when attempting to obtain the magical three bids? Performance spec?
- It may be time for a paradigm shift.

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Additional Safety Considerations

Field Commissioning of Fume Hoods

ASHRAE-110

Tracer gas containment test

SEFA 1.3-2002 fume hood test

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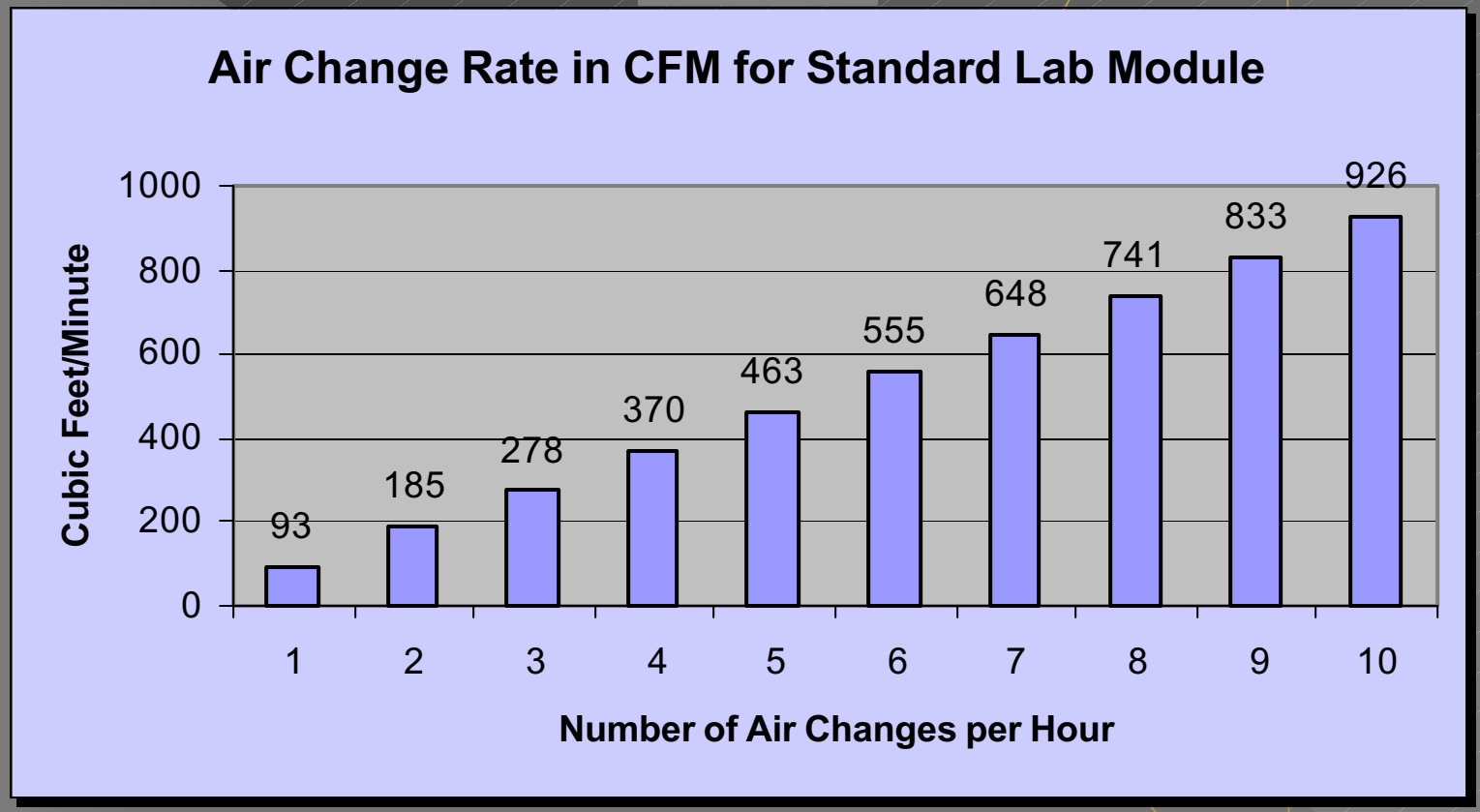
When is a lower face velocity fume hood the right choice? Standard design hood? Or VAV?

Mechanical system loads for laboratory spaces are driven by either the ventilation loads or the plug loads.

Plug Loads

Ventilation Loads

Laboratory Air Change Rates



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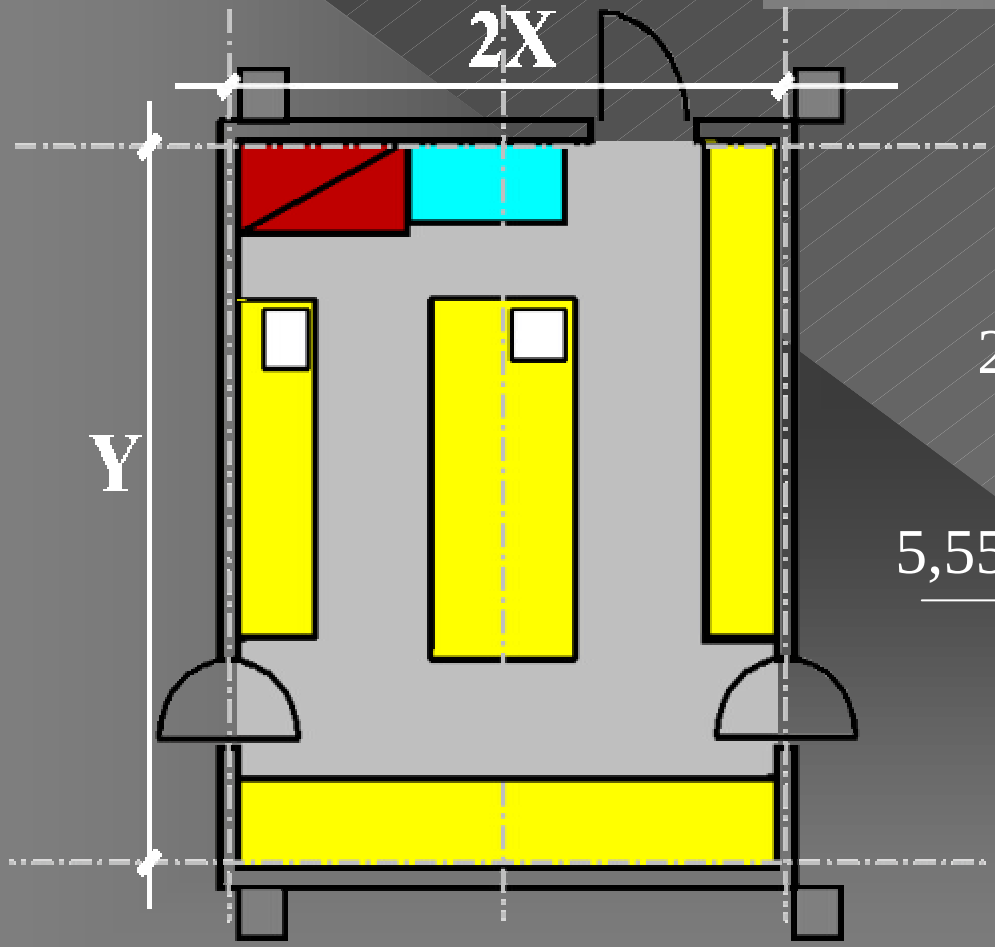
Typical Double Module Laboratory



Ventilation Driver

22’ x 28’ x 9’ = 5,554 cu.ft.

$$\frac{5{,}554 \text{ cu.ft. x } 6 \text{ ACH}}{60 \text{ min / hr.}} = 554 \text{ cfm}$$

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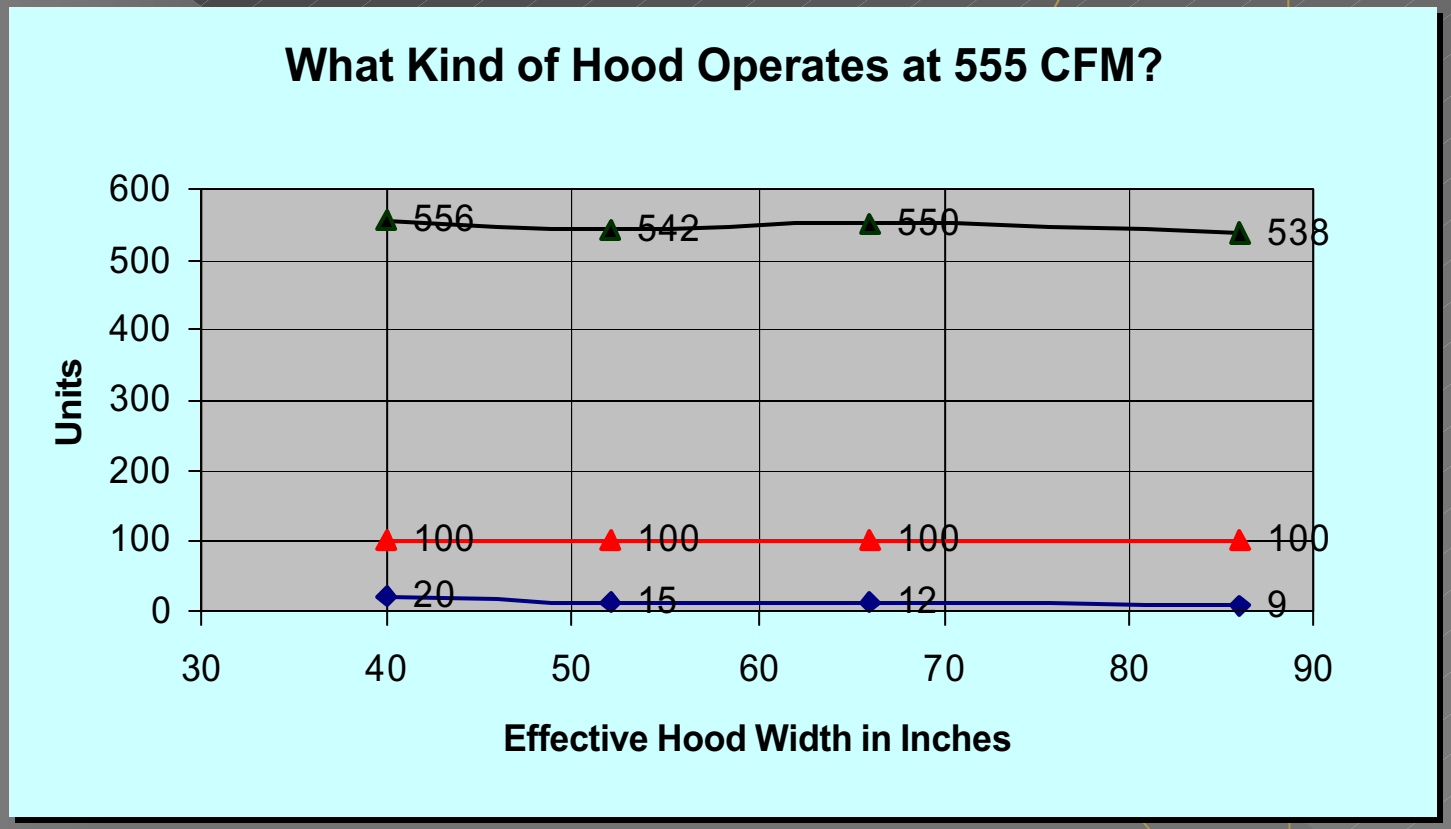
What is 555 CFM?



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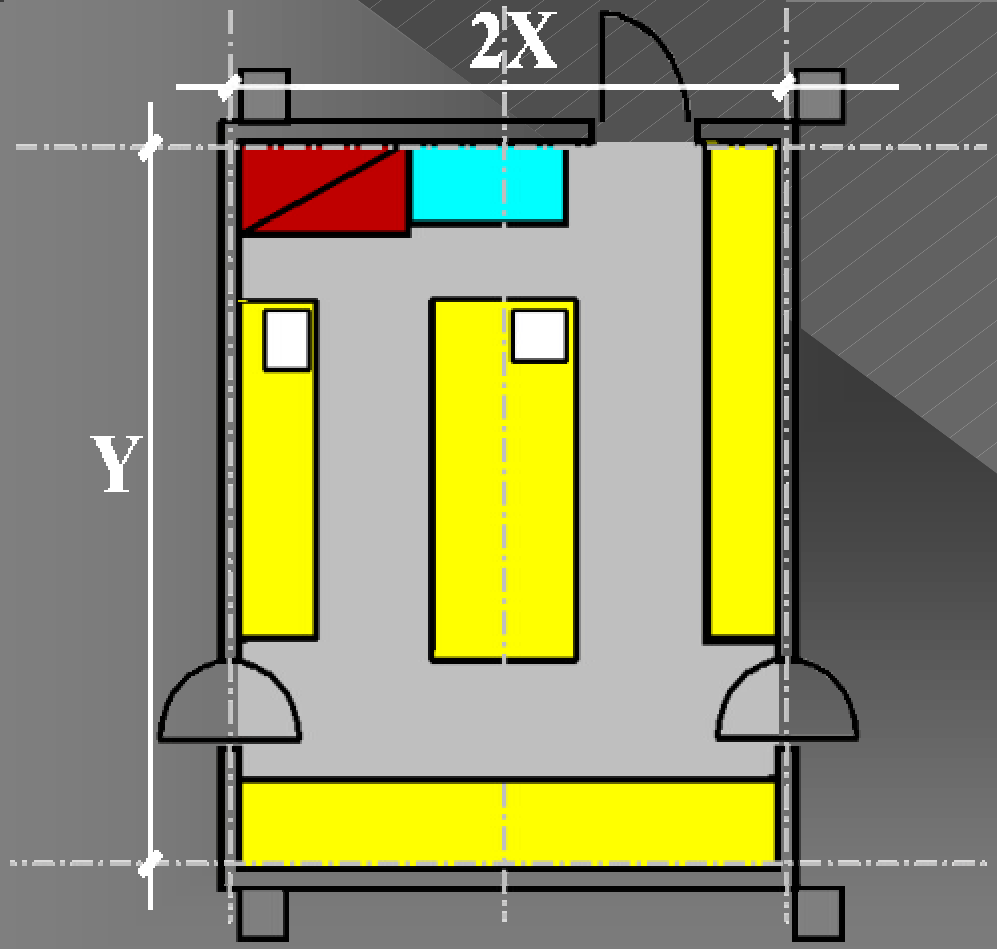

Plug Load Driven

22’ x 28’ = 616 sq.ft.

1W = 3 / 413 btu

6W / sq.ft. = 20.478 btu / h

20.478 btu / h x 616 = 12,614 btu / h

$$\frac{12{,}614 \text{ btu / h}}{(1.085)(20^{\circ}\text{F})} = 581 \text{ cfm}$$

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When are low-flow hoods not low-flow hoods?

- When being used with the sash in the proper operating position!
  - Specified low face velocity is with the sash in the full-open position or setup mode
  - Since these are constant volume hoods, when the sash is locked into the proper operating position, the face velocity increases to something closer to our standard of 100 fpm

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	Match Hood With Mechanical System		
	Double Module Lab with 6 ACH	Double Module Lab with heat driven loads	Open Lab Space with 6-8 ACH
CAV	**X**		
VAV		**X**	
LF Hi-Eff.			**X**

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The Message

- Understand what is driving the mechanical systems
- The successful laboratory designer will:
  - Apply “Right-Sizing” techniques
  - Use “Life cycle cost analysis” to advance fiscally sound decisions
  - Select the right hood for the right application. Take advantage of the many different types of hoods; even in the same facility
  - Make sure they work in concert with the building mechanical systems to arrive at the most energy efficient health & safety design solution

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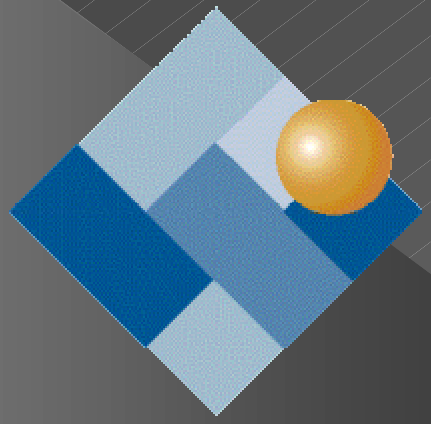
Thank You Very Much



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Setting the Stage for Scientific Discovery